DOCUMENT RESUME

ED 309 716 HE 022 682

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TITLE Good Student or Good Physician: What Are We Encouraging?
SPONS AGENCY Chicago Community Trust, Ill.; National Fund for Medical Education, Cleveland, Ohio.
PUB DATE Mar 89
NOTE 19p.; Paper presented at the Annual Meeting of the American Educational Research Association (San Francisco, CA, March 27-31, 1989). Also supported by the American Medical Association Education and Research Foundation.
PUB TYPE Speeches/Conference Papers (150) -- Reports - Descriptive (141)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *College Curriculum; Competence; Educational Benefits; *Education Work Relationship; *Graduate Medical Students; Higher Education; Instructional Effectiveness; Medical Education; Outcomes of Education; Physicians; *Premedical Students; Role of Education; Student Development; Student Reaction

ABSTRACT

A study based on student and faculty opinions is presented. It examines how well two types of preclinical curricula are preparing students to become competent physicians. Research questions include: how effective do students perceive their educational activities in two different preclinical curricula to be in helping them to pass their exams and become good physicians; how congruent are educational activities of preclinical students with student perceptions of activities leading to physician competence; and how congruent are the perceptions of students compared to those of their faculty. Preclinical students and faculty from a private midwestern American medical school participated. Responses were gathered from one class of traditional curriculum students and from one class of problem based learning students. Students were asked to indicate how often in the past year they had used each of the different study resources listed for them and to rate a series of educational activities by their effectiveness in helping them pass an exam and for preparing them to become good physicians. Results indicate a greater congruence between the goals of medical school and the development of physician-like behaviors, such as professional or self-directed learning, in a problem based curriculum than in a traditional curriculum. Results from both tracks agree in that the most clinically oriented educational activities were selected by all students as being most effective in helping them to become competent physicians. Contains 5 references. (SM)

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Good Student or Good Physician: What are we encouraging?

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Running Head: Paper Presented at the Annual Meeting of the American Educational Research Association, March, 1989 in San Francisco, CA.

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This paper is part of the Rush Longitudinal Study, supported by the National Fund for Medical Education (Burroughs Welcome Fund and the Ameritech Foundation), the American Medical Association Education and Research Foundation and the Chicago Community Trust. Other principal investigators for this study include David C. Clark, Edward Eckenfels, Gerald S. Gotterer, Jeffrey Salloway and Peter B. Zeldow, all of whom participated equally in study design, data collection, and the early stages of data analysis.

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Medical educators have long recognized that medical schools cannot produce good physicians; rather schools provide the opportunity for learning about medicine to occur. The students themselves must learn medicine and the skills involved in becoming and remaining a competent physician. Only part of these competencies come from formal instruction (1). The GPEP report (2) affirmed that the overall goals of all of medical education are to enable students to acquire knowledge, skills, values and attitudes that all physicians should have and to develop the abilities to undertake responsibilities for patient care. A generic goal of medical education is to produce competent physicians who have the ability and desire to constantly improve their competence. The GPEP report (2) recognizes that self-directed learning behaviors are an integral part of physician competence and that medical schools should foster this behaviour. Adult educators (3) feel that competent professionals are among the most active self-directed learners. In fact this learning characteristic may help to distinguish competent professionals from less competent ones (3). The formal educational process should help students to develop the ability and desire to continue acquiring knowledge to aid in solving problems. To determine if medical school are achieving this goal, they must engage in on-going evaluation.

One widely accepted model of evaluation is the determination of the congruence between performance and objectives, an idea first introduced by Tyler (4). Framed this way formative program evaluation concerns determining the congruence between the program goal and how well the goals have been met. The goals of preclinical instruction are to begin developing physician competence and to prepare students for the clinical curriculum in the hope that the combination of these two types of curricula will develop good physicians.

In this study we will examine how well two types of preclinical curricula (e.g., traditional and problem based) are preparing students to become competent physicians according to student and faculty opinions. The research questions addressed here include:

1. How effective do students perceive their educational activities in two different preclinical curricula for helping them to pass their exams and to become good physicians?
2. How congruent are educational activities of preclinical students with student perceptions of activities leading to physician competence especially relating to professional learning abilities and clinical skills?
2. How congruent are the perceptions of students compared to those of their faculty?

Methodology

Sample Preclinical students and their faculty from a private mid-western American medical school participated in this study. Responses were gathered from one class of traditional curriculum students and the same entering class of problem based learning students. The traditional curriculum involves mostly lectures and laboratories while the problem based curriculum is composed of small group discussions of clinical cases with students studying material on their own. The same faculty are involved in both curricula. Students from both types of curricula were sampled at two time points: at the end of their first year and at the end of their second year. 62 (61%) of the first year, 46 (46%) of the second year traditional curriculum students and 17 (94%) first year, 9 (56%) second year problem based curriculum students responded.

A representative sample of both classes responded at both time points. 42 (69%) faculty teaching in both curriculum, composed of physicians and basic scientists also completed a similar questionnaire.

Instrument and analyses. The students completed the same questionnaire at the end of their first and second years. First, students were asked to indicate how often in the past year they had used each of the different study resources listed for them. Next, the students in each track were asked to rate a series of educational activities two ways: according to their effectiveness in helping to pass an exam and again for preparing them to become good physicians. The traditional curriculum students rated 13 activities. The problem based curriculum students rated 12 of the same items plus five items relating directly to the problem based curriculum. (The one item from the traditional curriculum that the problem based students did not rank was a classroom activity that the problem based curriculum students could not participate in.) The educational activities were chosen to reflect the variety of learning activities appropriate for each curriculum. The problem based curriculum students rated the traditional curriculum activities because of a suspection by some of the faculty that these students were participating in traditional curriculum educational activities. For each item, the students rated how effective this activity was for both passing an exam and becoming a good physician using a five point scale with 1 = not at all effective, 3 = somewhat effective and 5 = very effective. Analyses were kept separate by curricular track.

The faculty rated the educational activities from both the traditional curriculum and the problem based curriculum in terms of perceived effectiveness for passing an examination and for becoming a good physician in the same way that the students did.

Mean usage scores by curriculum were computed for each study resource. From the scores for each educational activity, two mean effectiveness scores were determined for the students and the same two for the faculty. The two mean effectiveness scores were for passing an exam and for becoming a good physician. The resulting mean scores then were ranked to facilitate comparisons between the two groups of students and the faculty and to look at the extremes of the lists.

Results

All of the tables give data from the end of the second year. The results are very similar for both years. Table 1 shows the mean scores, t test results for each item and ranks of the frequency of use of study resources. The students use study resources quite differently depending on their curriculum with resources little used in the problem based curriculum frequently used in the traditional track and vice versa. For example, co-op notes taken by the students of the traditional curriculum lectures and faculty generated syllabi of the traditional curriculum content are frequently used in the traditional curriculum, but rarely used in the problem based curriculum. Table 2 compares the educational activities in terms of their perceived effectiveness for passing examinations for the two preclinical curricula.

Table 3 compares these activities in terms of their perceived effectiveness for becoming a good physician for students from both curricula. Both tables 2 and 3 show how dissimilar the groups of students are in their perceptions of effectiveness for passing examinations and how similar the two groups are in terms of their perceptions of effectiveness for becoming a good physician. (The two groups take different examinations.) Table 4 lists the perceived most and least effective educational activities for the traditional curriculum students; table 5 does this for the problem based curriculum students. An * beside the item on tables 4 and 5 indicates that the faculty perceive this item similarly (either most or least effective) based upon their ranked mean scores.

In the traditional curriculum only one activity, workshops, was seen as being most effective for both passing examinations and for becoming a good physician. These workshops were case discussions emphasizing pathophysiology content. 2/5 of the activities that were perceived by the traditional curriculum students as being most effective for becoming a good physician were seen as least effective of passing their exams. For example, although the traditional curriculum students recognized that they needed to read journals as physicians, they rarely used them as a study resource, probably because they were not effective to help them pass exams. The traditional curriculum activities were seen as least effective for the problem based curriculum students in terms of helping them pass exams or becoming a good physician.

3/5 of the activities were perceived by the problem based curriculum students as both most effective for passing an exam and for becoming a good physician. These activities were textbooks, clinical skills sessions and problem solving sessions.

The educational activities ranked as the most effective for passing examinations in both tracks were also the most used study resources by students in that curriculum. The three most used study resources by the problem based curriculum students were also seen as the most effective in becoming a good physician. Only textbooks from the list of most used study resource in the traditional curriculum was seen as being very effective for helping to become a good physician. There was general agreement between the students and the faculty in terms of activities which are the most and the least effective for becoming a good physician. Faculty perceptions tended to agree with the traditional curriculum students in terms of what is most useful to pass their exams but also were seen as least useful to become a good physician. For the problem based curriculum, the faculty show agreement with the students in what is or is not useful to become a good physician, but shows less congruence with the students on activities which effect exam performance. The faculty felt that their own curricular materials such as the faculty developed objectives and suggested resource material as defined in the problem based curriculum guidebooks and faculty resource sessions were more helpful to pass an exam than the students did.

Faculty resource sessions were scheduled sessions in which students could ask faculty questions, faculty could go over difficult material or ask the students questions.

Discussion

The same study was repeated with the next entering class. The results reported on in this study were generally replicated with the next class. While the sample size is small in both classes, the same results tends to show their reliability.

Our results show a startling difference when comparing the two types of instruction/learning. There is little congruence between what the students in the traditional curriculum see as effective for passing exams when compared with becoming a good physician. By contrast the results from the problem based curriculum students are striking for the congruence between what they see as effective in the short term for passing an exam and effective in the long term for becoming a good physician. The results from both tracks agree in that the most clinically oriented educational activities were selected by all students as being most effective in helping them to become competent physicians.

Since the two tracks exist in the same school, some faculty have felt that the problem based students may be using the traditional curriculum materials such as lectures and faculty developed syllabi instead of gathering the material on their own.

The results of this study show that the problem based students do not find the traditional curriculum materials helpful for either passing examinations nor for becoming a good physician. Thus, they are not using them very much.

The educational activities used most often by the students in the traditional curriculum and seen as most effective in passing their examinations encourage "student like activities" such as taking direction on what and how to learn from the faculty. While good student behaviors, which include studying lecture notes (co-op notes), handouts made by the faculty (syllabi) and assignments from textbooks, often lead to student success, these same student strategies may not be effective strategies for becoming a competent physician. As the students recognize, physician achievement is rarely dependent upon faculty generated handouts, assignments or lectures. Therefore, students selected less "student-like" activities as most effective for becoming a good physician.

While faculty and students in both tracks selected similar activities as effective for becoming a good physician, only students in the problem based track saw these activities as also effective for passing exams. These same activities were more used by the problem based students. Activities seen as more effective for becoming a good physician seem to us to be both more clinical in nature and more professionally relevant.

These "physician-like behaviours" include such self-directed learning skills, as defined by Knowles[3] and Gagne,[5] such as looking up answers to problems on their own, consulting with peers and more senior colleagues and reading journals. By their report, the problem based preclinical curriculum students are engaged in more activities which help them to acquire some of the skills required to become and remain competent physicians. It would be interesting to see how the students view these activities during their clinical years.

While this study was only concerned with medical students, the same principles seem to apply to other clinical professions. All of these professionals need to seek out information on their own and to be self-directed learners. Other professional schools might try to use some of the key elements of problem based learning, such as small group discussions of clinical cases which leads students to define their own learning needs and to gathering information on their own, in order to foster more professional learning behaviors in their studies.

Conclusion and Implication. Medical curricula should encourage physician-like behaviour early, even during the preclinical years, if possible. These behaviors include illustrating the clinical relevance of basic science material, developing problem solving skills, learning acquisition skills such as seeking out information on their own or consulting with others, and continually improving and updating their knowledge.

If the goals of the preclinical years are to lay the foundation for future practice, then preclinical curricula should be made to be more congruent with these goals. In addition to providing the students with a huge fund of basic science knowledge, preclinical curricula should foster the development of the physician-like behaviors which will help to prepare them for clinical work. The results of this study indicate that there seems to be a greater congruence between the goals of medical school and the development of physician like behaviors, such as professional or self-directed learning, in a problem based curriculum than in a traditional curriculum.

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Table I Use of Study Resources from a list of 8 resources
score 1 = never, 3 = sometimes, 5 = always. / rank 1 = most used

Resource	TC mean	PBC mean	t test	TC rank	PBC rank
TC co-op notes	4.26	1.56	****	2	8
textbooks	3.35	4.53	**	3	1
journals	1.68	3.23	***	8	3
TC syllabi	4.82	2.88	***	1	5
Peers, faculty (informal discussions)	2.86	3.35	n.s.	5	2
Audio visual materials	2.90	3.11	n.s.	4	4

TC = traditional curriculum PBC = problem based curriculum

TABLE 2

EFFECTIVENESS OF EDUCATIONAL ACTIVITIES TO PASS AN EXAM

	PBC MEAN SCORE	RANK	TC MEAN SCORE	RANK
Workshops	------	-----	4.111	1
Syllabi	2.222	14	3.822	2
Co-op notes	1.857	16	3.773	3
Lectures	1.333	17	3.578	4
Labs	2.888	8	3.289	5
Textbooks	4.44	1	3.266	6
Clinical skills sessions	4.00	2	2.956	8
Study groups	3.50	3	-----	--
Problem solving sessions	3.333	4	-----	--
Peer informal discussions	3.22	5	2.809	9
Journals, articles	3.111	6.5	1.561	13
Computer exercises	2.25	13	2.600	10
Learning resource center	3.000	8	3.05	7
Seminars/large group discussions	2.83	10.5	1.837	12
Faculty informal discussions	3.11	6.5	2.103	11
PBC guidelines	1.889	15	-----	--
PBC learning issues notes	2.444	12	-----	--
PBC resouce sessions	2.833	10.5	-----	--

Key

rating scale - 1 = not at all effective 5 = very effective
rank - 1 = most effective
--- not rated by those students

TABLE 3

EFFECTIVENESS OF EDUCATIONAL ACTIVITIES

TO BECOME A GOOD PHYSICIAN

	PBC		TC	
CATEGORY	MEAN SCORE	RANK	MEAN SCORE	RANK
Workshops	----	----	4.333	1
Clinical skills sessions	4.44	1	4.153	2
Informal discussions with peers	3.33	7	3.619	3
Textbooks	4.33	2	3.600	4
Journals, articles	3.666	3.5	3.464	5
Problem solving sessions	3.667	3.5	-----	-
Informal discussions with faculty	3.55	5	3.308	6
Syllabi	1.777	13	2.933	10
Co-op notes	1.428	15	2.523	12
Lectures	1.333	16	3.000	9
Labs	3.222	8	3.267	7
Study groups	3.50	6	-----	--
Computer exercises	1.1625	17	2.4000	13
Learning resource centre	2.889	9	2.925	11
Seminars/large group discussions	2.83	11	3.194	8
PBC guidebooks	1.556	14	------	--
PBC learning issue notes	2.555	12	------	--
PBC resource sessions	2.885	10	------	--

Key
Rating scale - 1= not at all effective 5= very effective
Rank 1= most effective
--- Not rated by those students

TABLE 4
TRADITIONAL CURRICULUM END M2

MOST AND LEAST EFFECTIVE EDUCATIONAL ACTIVITIES TO PASS AN EXAM
AND TO BECOME A GOOD PHYSICIAN

Most Effective to Pass Exam	Mean Score	Most Effective to Become Good Physician	Mean Score
Workshops	4.11	*Workshops	4.33
*Syllabi	3.82	*Clinical Skills Sessions	4.15
*Co-op notes	3.77	Informal discussions w/peers	3.619
*Lectures	3.58	Textbooks	3.60
*Lab	3.29	*Journals, Articles	3.46

Least Effective to Pass Exam	Mean Score	Least Effective to Become Good Physician	Mean Scores
*Journals, Articles	1.56	*Computer Exercise	2.40
*Seminars	1.84	*Co-op Notes	2.52
Informal discussions with faculty	2.10	*Syllabi	2.93
Computer exercises	2.60	*Learning resource center	2.93
Informal discussions with peers	2.80	*Lectures	3.00

Key

* = Faculty rated this activity similary
(i.e. falls into the same extreme category)
1 = Not at all Effective 5 = Very effective

3/5 activities most effective for passing an exam are least effective for becoming a good physician.

1 - activity workshops seen as both most effective for passing exams and becoming a good physician
2/5 - activities seen as most effective for becoming a good physician are seen as least effective passing exam

TABLE 5

PROBLEM BASED CURRICULUM END M2
MOST AND LEAST EFFECTIVE EDUCATIONAL ACTIVITIES TO PASS AN EXAM
AND TO BECOME A GOOD PHYSICIAN

Most Effective to Pass Exam	Mean Score	Most Effective to Become Good Physician	Mean Score
Textbooks	4.44	*Clinical Skills Sessions	4.44
Clinical Skills Sessions	4.00	Textbooks	4.33
*Study Groups	3.50	*Journals	3.67
Problem Solving Sessions	3.33	*Problem Solving Sessions	3.67
Informal discussions w/Peers	3.22	*Informal discussions w/Faculty	3.55

Least Effective to Pass Exam	Mean Score	Least Effective to Become Good Physician	Mean Score
		*Computer exercises	1.16
*Traditional curriculum lectures	1.33	*Traditional curriculum lectures	1.33
Co-op notes from Regular curriculum	1.86	*Co-op notes from traditional curriculum	1.428
PBC guidebooks	1.89	PBC guidebooks	1.56
Syllabi from Regular curriculum	2.22	*Syllabi from regular curriculum	1.77
*Computer exercises	2.25		

Key

* = faculty rated this activity similarly
(i.e. falls into the same extreme category)

3/5 of the activities were seen as most effective for both passing an exam and for becoming a good physician. Problem based curriculum activities seen as relevant for becoming a good physician. Traditional Curriculum Activities are seen as not effective for either passing an exam nor for becoming a physician.